

REMARKS

This paper is responsive to the Office Action mailed January 23, 2009. Upon entry of the present Amendment, claims 6, 8, 10, 13, 14, and 15 will have been amended and claims 1-5, 7, 9, 11-12, and 16-18 will have been cancelled without prejudice or disclaimer, and while reserving the right to pursue these claims in one or more divisional or continuation applications. Applicants note no new matter has been added. Thus, upon entry of this Amendment, claims 6, 8, 10, 13, 14, and 15 are under consideration by the Examiner, of which claim 6 is independent.

Claim Objections

The Office Action objects to claims 6-7, 10, and 16-18 because of informalities and requests clarification. Applicants note that upon entry of this Amendment, claims 6 and 10 have been amended and claims 7 and 16-18 have been cancelled. Applicants respectfully submit that the amendments further clarify the subject matter of the claims. Accordingly, Applicants submit that the objection has been overcome and request withdrawal of the objections.

Claim Rejections***35 U.S.C. § 112***

The Office Action rejects claims 1, 3-4, 6, and 8-9 under 35 U.S.C. § 112, second paragraph as being indefinite.

Applicants note that claims 1, 3-4, and 9 have been cancelled with this Amendment. Further, Applicants note that claims 6 and 8 have been amended to further clarify the subject matter of the claims.

The Examiner inquires if the contact angle of the surface is “with respect to the film deposited on the wafer thereafter or in connection to a means of contact to the surface of the wafer” (Office Action, pg. 3). Applicants respectfully direct attention to the Specification at pg. 12, ¶ 0022; Tables 1 and 2, and related discussion (pgs. 17-23). Applicants respectfully note that one of skill in the art would recognize that the contact angle is after spin-drying of the wafer and prior to deposition of the epitaxial growth, such that the benefits of reduced absorption of particles/mounds during the epitaxial growth could be realized.

Accordingly, Applicants submit that these rejections have been rendered moot and respectfully request withdrawal of these rejections.

Art Based Rejections

Over Dietze

The Office Action rejects claims 11-12 under 35 U.S.C. § 102(b) as being anticipated by Dietze (U.S. Patent No. 6,454,852). Applicants note that claims 11 and 12 are presently cancelled. Accordingly, Applicants respectfully submit that this rejection is rendered moot.

Over Dietze in view of Brabant

The Office Action rejects claims 1-2, 5, and 13-15 under 35 U.S.C. § 103(a) as being obvious over Dietze in view of Brabant (U.S. Patent Pub. 2003/0036268). Applicants note that claims 1-2, and 5 are presently cancelled. Accordingly, Applicants respectfully submit that this rejection is rendered moot.

Applicants further note that claims 13 – 15 will be amended to further clarify the claims upon entry of this Amendment. Applicants respectfully submit that claims 13 – 15 are allowable

at least for the reason that they depend from an allowable base claim and because they recite additional features that are neither anticipated nor obvious in view of the cited documents.

Applicants note that Dietze pertains to an RCA cleansing process of wafer surfaces and epitaxial growth. The Office Action relies on Brabant to cure the deficiencies of Dietze. Applicants note that Brabant pertains to enabling an Si wafer to have a water repellent surface by dipping the Si wafer in an HF solution. However, Applicants respectfully submit that these documents fail to, singly or in combination, disclose the features of the pending claims. In particular, Dietze in view of Brabant fails to disclose, for example, a method for producing an epitaxial wafer by depositing a film of epitaxial layer through an epitaxial growth over a top surface of a silicon wafer, said method comprising: a cleaning for cleaning a top and a back surfaces of a silicon wafer with a SC-1 liquid and a SC-2 liquid; a hydrophobicating cleaning, after said cleaning, for cleaning said back surface of said silicon wafer to be a water repellent surface; and a hydrophilicating cleaning for cleaning said top surface of said silicon wafer to be a hydrophilic surface, wherein after said cleaning, hydrophobicating cleaning, and hydrophilicating cleaning are finished, a film of epitaxial layer is deposited through an epitaxial growth over said top surface of said silicon wafer said hydrophobicating cleaning and said hydrophilicating cleaning are simultaneously performed, and the hydrophobicating cleaning is a cleaning using an HF solution or BHF solution.

Applicants respectfully submit that the cited documents fail to suggest that the cleanings are concurrently performed in accordance with the pending claims. Because both of the surfaces can be cleaned in a single process, formation of mounds on the epitaxial surface due to particles is prevented. Thus, simultaneously, occurrence of cloud on the back surface is prevented.

Accordingly, Applicants respectfully submit that this rejection has been rendered moot and respectfully request withdrawal of the outstanding rejections.

Over Dietze in view of Tanaka

The Office Action rejects claims 6-7 under 35 U.S.C. § 103(a) as being unpatentable over Dietze in view of Tanaka (U.S. Patent No. 6,239,045).

Applicants note that claim 7 is cancelled with this Amendment and the substance of the original claim 7 has been incorporated into independent claim 6. Applicants note that Dietze pertains to an RCA cleaning process of wafer surfaces and epitaxial growth while Tanaka discloses eliminating metallic impurities on a wafer having a mirror-polished surface before epitaxial grown by an O₃⁺ water cleansing. However, Applicants respectfully submit that the documents fail to, singly or in combination, disclose a method for producing an epitaxial wafer by depositing a film of epitaxial layer through an epitaxial growth over a top surface of a silicon wafer, said method comprising: a cleaning for cleaning a top and a back surfaces of a silicon wafer with a SC-1 liquid and a SC-2 liquid; a hydrophobicating cleaning, after said cleaning, for cleaning said back surface of said silicon wafer to be a water repellent surface; and a hydrophilicating cleaning for cleaning said top surface of said silicon wafer to be a hydrophilic surface, wherein after said cleaning, hydrophobicating cleaning, and hydrophilicating cleanings are finished, a film of epitaxial layer is deposited through an epitaxial growth over said top surface of said silicon wafer said hydrophobicating cleaning and said hydrophilicating cleaning are simultaneously performed.

Applicants respectfully submit that the cited documents fail to suggest that the cleanings are concurrently performed in accordance with the pending claims. Because both of the surfaces

can be cleaned in a single process, formation of mounds on the epitaxial surface due to particles is prevented. Thus, simultaneously, occurrence of cloud on the back surface is prevented.

Accordingly, Applicants respectfully submit that this rejection has been rendered moot and respectfully request withdrawal of the outstanding rejections.

Over Dietze in view of Tanaka, further in view of Sato

The Office Action rejects claim 10 and 16-18 under 35 U.S.C. § 103(a) as being unpatentable over Dietze in view of Tanaka, further in view of Sato (U.S. Patent No. 6,942,737).

Applicants note that claims 16 – 18 are cancelled upon entry of this Amendment.

Applicants further note that claim 10 is amended to further clarify the subject matter of the claims and is allowable at least for the reason that it depends from an allowable base claim and because it recites additional features that are neither anticipated nor obvious in view of the cited documents. Applicants respectfully submit that, further to the foregoing reasons regarding claim 6, Sato fails to cure the deficiencies of the hypothetical combination of Dietze in view of Tanaka.

Applicants further submit that the cited documents fail to suggest that the cleanings are concurrently performed in accordance with the pending claims. Because both of the surfaces can be cleaned in a single process, formation of mounds on the epitaxial surface due to particles is prevented. Thus, simultaneously, occurrence of cloud on the back surface is prevented. In particular, Applicants respectfully submit that the documents fail to, singly or in combination, disclose a method for producing an epitaxial wafer by depositing a film of epitaxial layer through an epitaxial growth over a top surface of a silicon wafer, said method comprising: a cleaning for cleaning a top and a back surfaces of a silicon wafer with a SC-1 liquid and a SC-2 liquid; a hydrophobicating cleaning, after said cleaning, for cleaning said back surface of said silicon

wafer to be a water repellent surface; and a hydrophilicating cleaning step for cleaning said top surface of said silicon wafer to be a hydrophilic surface, wherein after said cleaning, hydrophobicating cleaning, and hydrophilicating steps of cleaning having been finished, a film of epitaxial layer is deposited through an epitaxial growth over said top surface of said silicon wafer said hydrophobicating cleaning and said hydrophilicating cleaning are simultaneously performed, where the hydrophilicating cleaning provides a cleaning by a combination of a sponge brush with a purified water.

Accordingly, Applicants respectfully submit that this rejection has been rendered moot and respectfully request withdrawal of the outstanding rejections.

CONCLUSION

For at least the foregoing reasons, it is respectfully submitted that all pending claims are patentably distinct over the documents employed in the rejection of record. Applicants request reconsideration and withdrawal of the rejections of record. Allowance of the application with an early mailing date of the Notices of Allowance and Allowability is therefore respectfully requested.

If there should be any questions, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully Submitted,
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